INTEGRATION (Q 8, PAPER 1)

2004

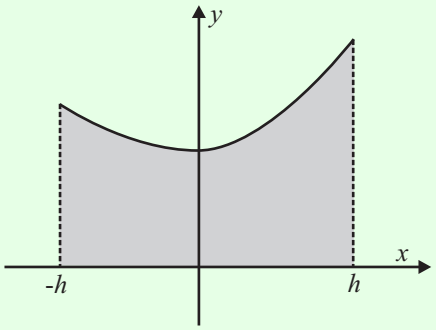
8 (a) Find (i) $\int \frac{1}{x^2}\,dx$ (ii) $\int \cos 6x\,dx$

8 (b) Evaluate (i) $\int_3^6 \frac{dx}{\sqrt{36-x^2}}$ (ii) $\int_0^{\frac{\pi}{3}} \sin x \cos^3 x\,dx$

8 (c) The graph of the function $f(x) = ax^2 + bx + c$ from $x = -h$ to $x = h$ is shown in the diagram.

(i) Show that the area of the shaded region is $\frac{h}{3}[2ah^2 + 6c]$.

(ii) Given that $f(-h) = y_1$, $f(0) = y_2$ and $f(h) = y_3$, express the area of the shaded region in terms of y_1, y_2, y_3 and h.



ANSWERS

8 (a) (i) $-\frac{1}{x} + c$ (ii) $\frac{1}{6}\sin 6x + c$

8 (b) (i) $\frac{\pi}{3}$ (ii) $\frac{15}{64}$

8 (c) (ii) $A = \frac{h}{3}[y_1 + 4y_2 + y_3]$